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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MAI, ANH D

ART UNIT PAPER NUMBER

2814

DATE MAILED: 12/19/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/259,145

Applicant(s)

PAN ET AL.

Examiner

Anh D. Mai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 October 2001.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 25,26,31-34,37-40 and 43-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 25,26,31-34,37-40 and 43-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other:  |

**DETAILED ACTION**

1. The amendment filed November 28, 2000 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure.
2. Claims 25, 26, 31-34, 37-40 and 43-49 are rejected under 35 U.S.C. 112, first paragraph, for containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention, as previously applied.
3. Claims 25, 26, 31-34, 37-40 and 43-49 are rejected under 35 U.S.C. 112, second paragraph, for being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, as previously applied.
4. Claims 25, 26, 31, 33, 34, 37-40 and 43-48 are rejected under 35 U.S.C. 103(a) for being unpatentable over Tada (U.S. Patent No. 5,545,577) in view of Koike (5,874,325), as previously applied.
5. Claims 32 and 49 are rejected under 35 U.S.C. 103(a) for being unpatentable over Tada '577 and Koike '325 as applied to claims 25 and 46 above, and further in view of Shim et al. (U.S. Patent No. 5,846,596), as previously applied.

***Drawings***

6. The formal drawings were received on October 25, 2001. These drawings are accepted.

***Response to Amendment***

7. The amendment filed October 15, 2001 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

Previously (Amendment G, filed July 5, 2001) added: "***free of field oxide***"

Newly added: "***wherein said substantially dopant-free, uninterrupted diffusion barrier layer is sufficient depth to substantially reduce encroachment of said isolation structure formed after annealing of said pre-anneal intermediate structure***" (claims 25, 33, 39 and 46).

Applicant is required to cancel the new matter in the reply to this Office Action.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 25, 26, 31-34, 37-40 and 43-49 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There does not appear to be a written description of the claim limitation "***free of field oxide***" and "***wherein said substantially dopant-free, uninterrupted diffusion barrier layer is***

***sufficient depth to substantially reduce encroachment of said isolation structure formed after annealing of said pre-anneal intermediate structure***” in the application as filed.

The specification lacks specific elements that links the thickness of the diffusion barrier layer to the reduction of encroachment.

Further, the presently invention claims “pre-anneal intermediate structure”, thus elements present *after the annealing* should be precluded from the claim invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 25, 26, 31-34, 37-40 and 43-49 are rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention. Evidence that the claims fail(s) to correspond in scope with that which applicant(s) regard as the invention can be found in the preamble. In the pre-amble, applicant has claimed “[A] pre-anneal intermediate structure”, and this statement indicates that the invention is different from what is defined in the claim(s) because all claims subsequently claimed “reduce encroachment of said isolation structure formed ***after annealing*** of said pre-anneal intermediate structure”.

10. Claims 25, 26, 31-34, 37-40 and 43-49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims recites “a pre-anneal intermediate structure in the formation of an isolation structure” on lines 1-2. In the context of the claim, the isolation structure does not exist.

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The claims further recites: "uninterrupted diffusion barrier layer is sufficient depth to substantially reduce encroachment of *said isolation structure formed after annealing of said pre-anneal intermediate structure*".

Additionally, the reduction of encroachment is the result of the process, not of the depth of the barrier layer.

It appears that the claims fail to particularly pointing out his invention.

Which is the structure, pre-anneal structure or post oxidation structure, the applicant intended to encompass?

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 25, 26, 31, 33, 34 37-40 and 43-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tada (U.S. Patent No. 5,545,577) in view of Koike (5,874,325).

With respect to claims 25, 33, 39 and 46, as best understood by the examiner, Tada teaches a pre-anneal intermediate structure in the formation of an isolation structure for a semiconductor device substantially as claimed including:

a semiconductor substrate (100) free of field oxide structures and having a first surface and a second surface, the first surface opposing the second surface;

at least one p-well (3) and at least one n-well (2) on the substrate first surface;

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at least one p-type area (5) within the at least one n-well;  
at least one n-type area (6) within the at least one p-well; and  
a substantially dopant-free, uninterrupted diffusion barrier layer over the substrate first surface, wherein the substantially dopant-free, uninterrupted diffusion barrier layer is sufficient depth to substantially reduce encroachment of the isolation structure formed after annealing of said pre-anneal intermediate structure. (See Fig. 2c and 3a, col. 6, ll. 3-32).

Thus, Tada is shown to teach all of the features of the claim with the exception of the substantially dopant-free barrier layer is formed extending over the substrate second surface.

However, Koike teaches a substantially dopant-free barrier layer (104) is formed extending over the substrate (101) first and second surface.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to form the substantially dopant-free barrier layer of Tada extending over the first and second surface as taught by Koike to prevent the second surface from oxidizing.

Further, the pre-anneal intermediate semiconductor substrate of Tada appears to be free of field oxide structures. (See Fig. 2c).

The depth of the substantially dopant-free barrier layer of Tada appears to be sufficient to substantially reduce encroachment of the isolation structure (9).

Product by process limitation:

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The expression “wherein the substantially dopant-free, uninterrupted diffusion barrier layer is sufficient depth *to substantially reduce* encroachment of the isolation structure formed after annealing of said pre-anneal intermediate structure” is taken to be a product by process limitation and is given no patentable weight. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al.*, 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

Further, since the substantially dopant-free barrier layer of Tada is formed, obviously having a depth, therefore, the substantially dopant-free, uninterrupted diffusion barrier layer of Tada is also sufficient to substantially reduce encroachment of the isolation structure formed after annealing of the pre-anneal intermediate structure.

With respect to claims 26, 34, 40 and 47, the structure of Tada also includes an oxide layer (4) between the substrate first surface and the substantially dopant-free barrier layer.

With respect to claims 31, 37, 43 and 48, the substantially dopant-free barrier layer of Tada is silicon nitride.

With respect to claim 38, the at least one doped area of Tada comprises an impurity selected from the group consisting of a n-type impurity and a p-type impurity.



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With respect to claim 44, the at least one first doped area of Tada comprises a p-type impurity (2) and the at least second, differently doped area comprises an n-type impurity.

With respect to claim 45, the at least one first doped area of Tada comprises an n-type impurity (2) and the at least second, differently doped area comprises a p-type impurity.

2. Claims 32 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tada '577 and Koike '325 as applied to claims 25 and 46 above, and further in view of Shim et al. (U.S. Patent No. 5,846,596).

Tada and Koike teach all of the features of the claim with the exception of using silicon oxynitride for the substantially dopant-free barrier layer.

However, Shim teaches the oxidation resistant layer (130) comprising silicon oxynitride (130). (See col. 3, ll.18-20).

It would have been obvious to one having ordinary skill in the art at the time of the invention to form the substantially dopant-free, uninterrupted diffusion barrier layer of Tada using silicon oxynitride as taught by Shim because it has an added advantage of oxidation resistance.

### ***Response to Arguments***

Regarding the Notice of Non-Compliant, the amendment dated November 28, 2000 indicated the claims as "three time amended" then the amendment dated April 12, 2001 indicated the claims as "four time amended". The Office perceives that the claims have been amended

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(from three time amended to four time amended) thus expecting a mark-up version showing the change, none was found, however. Therefore, the Notice of Non-Compliant has been sent.

In the response dated July 5, 2001, applicant indicated that there was no change in neither the claims nor the specification, thus applicant *has overcome* the Notice of Non-Compliant.

3. Applicant's arguments filed October 15, 2001, regarding 35 U.S.C. 132, 112, first and second paragraph, have been fully considered but they are not persuasive.

***35 U.S.C. 132 Objection and 112, first paragraph:***

Applicant appears to rely on the drawings to support his contention that the substrate is "free of field oxide". However, the drawings are not drawn to scale. Thus, the drawings by themselves can not be relied upon to claim the subject matters that are not disclosed. There are many things that are inherent of the pre-anneal intermediate structure. However, "free of field oxide" is not one of them. Furthermore, the specification on page 7, paragraph 1 indicates that "[I]t should be understood that the figures presented in conjunction with this description ***are not meant to be actual cross-section views*** of any particular portion of an actual semiconductor device, but ***are merely idealized representations*** which are employed to more clearly and fully depict the process of the invention than would be otherwise be possible".

Thus, M.P.E.P 2163.06 only allows for the subject matters that are disclosed.

Applicant further added, "the term "free of field oxide structures" is *fully supported* by the as-filed application because the *application discloses* that the pre-anneal intermediate

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structure *is inherently* free of field oxide structures”. However, the specification *discloses none* of that. Additionally, applicant fails to provide support for his contention that “the pre-anneal intermediate structure *is inherently* free of field oxide structures”.

The objection and the rejection under 35 U.S.C. 132 and 112, first paragraph are therefore, maintained.

***35 U.S.C. 112, second paragraph:***

Applicant recited M.P.E.P 2703.05(i) “set forth definitely”. The specification, however, fails to neither set forth definitely nor positively discloses that the substrate are “free of field oxide” prior to the formation of the barrier layer.

M.P.E.P 2703.05(i) indicated that a negative limitation rendered the claim indefinite because it was an attempt to claim the invention by excluding what the inventors *did not invent* rather than distinctly and particularly pointing out what they *did invent*. *In re Schechter*, 205 F.2d 185, 98 USPQ 144. Further, any ***negative limitation or exclusionary proviso must have basis in the original disclosure***. *If alternative elements are positively recited* in the specification, they may be explicitly excludes in the claims. *In re Johnson*, 558 F.2d 1008, 1019, 194 USPQ 187, 196.

Since the specification fails to disclose “free of field oxide”, thus the claims are tried to exclude what the inventors *did not invent* rather than distinctly and particularly pointing out what they *did invent*, thus renders the claims indefinite.

The rejection is therefore, maintained.

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4. Applicant's arguments with respect to all claims, under art rejections, have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (703) 305-0575. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A.M  
December 14, 2001

*Douglas Wille*  
DOUGLAS WILLE